

**SUPPLY CHAIN MANAGEMENT PRACTICES OF FIRMS:
A FUNCTION OF IT CAPABILITY**

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Abstract

Firm collaboration and information sharing have been thematic in the supply chain management (SCM) literature, assuming the existence of a supporting information technology (IT) structure. However, the exact relationship between IT use and SCM practices has been primarily anecdotal in nature. The purpose of this research is to add to this understanding by profiling differences in SCM practices of firms based on their IT capability. We also evaluate the impact IT usage has on a range of organizational performance measures. Our findings show that firms with high IT capability engage in both intra and inter-organizational SCM practices to a greater degree than other firms, and perform higher on most organizational performance measures. This research contributes to the literature by helping document the role IT plays as an enabler of SCM activities. This research also suggests that the relationship between SCM practices and organizational performance measures is supported through a strong IT capability.

Keywords: Supply chain management; Information technology; Empirical research; Interdisciplinary

1. Introduction

Supply chain management (SCM) is founded on the philosophy of collaboration among supply chain partners (Narasimhan and Jayaram, 1998; Stank, Keller, and Daugherty, 2001). This collaboration is made possible through the sharing of large amounts of information along the supply chain, including operations and strategic planning data. Supply chain collaboration assumes an efficient and effective information technology (IT) system (Edwards, Peters, and Sharman, 2001). Information technology (IT), which allows for the transmission and processing of information necessary for synchronous decision making, can be viewed as the backbone of the supply chain business structure (Grover and Malhotra, 1999). For this reason the literature often refers to IT as an essential enabler of SCM activities (Mabert and Vankataraman, 1998).

Advancements in IT capabilities have significantly improved the extent of inter-organizational information sharing and coordination in decision making. Research has also shown that IT has the overall potential of providing a significant competitive advantage to firms (Earl, 1993; Ives and Jarvenpaa, 1991; Kathuria, Anandarajan and Igbaria, 1999). However, the relationship between the use of IT and specific SCM practices is primarily anecdotal and prescriptive in nature. Given the increased proliferation of information technology, a number of studies have called for more research to evaluate the impact IT has on SCM activities (Lewis and Talalayevsky, 1997).

The purpose of this research is to add to this understanding by profiling differences in SCM practices of firms based on their degree of IT usage. We also evaluate the impact IT usage has on organizational performance, based on a range of performance measures. We postulate that companies with advanced IT capability have a greater SCM focus and engage in a larger number of SCM practices than their less technologically sophisticated counterparts. We also postulate that these firms have significantly greater achievements on organizational performance measures as studies show process coordination to be a factor that significantly contributes to high performance

(Bowersox and Daugherty, 1995; Narasimhan and Jayaram, 1998; Sheombar, 1992). These assumptions are derived from the literature and serve as the basis for our research hypotheses.

The general impact IT has on the organization has been extensively studied. This research has ranged from studying the alignment of specific IT applications with the organizational competitive priorities (Kathuria, Anandarajan, and Igarria, 1999) to comparisons of the effectiveness of specific IT applications (Raghunatha, 1999). Research specific to SCM has been primarily strategic in nature. Studies have suggested that significant differences in SCM strategies and practices can be expected based on higher IT usage and capability. Studies by Bowersox and Daugherty (1987; 1995) identified information technology as one of the most common factors associated with advanced supply chain practice. Clinton and Closs (1997) used the Bowersox and Daugherty typology to relate firm practice to strategy specifications. Their findings confirm differences in the supply chain strategies of firms based on information technology use.

The importance of IT in SCM is further documented through the extended enterprise model, developed by Bowersox and Daugherty (1995), Bowersox, Closs, and Stank (1999), and modified by Edwards, Peters and Sharman (2001). The model identifies key attributes of firms moving toward world-class logistics, with an integrated IT system identified as a key component of this framework. The highest level firms within this framework are those that operate seamlessly across boundaries due to IT capability that enables information to flow freely in real time.

Although research supports the idea of IT as an enabler of SCM activities and documents its role in supply chain strategy, studies have not directly associated higher IT usage with greater involvement in specific SCM practices. SCM practices encompass a spectrum of activities, some internal and some external to the firm, all with the primary goal of creating value to the end-customer (Copaciano, 1997; Kahn and Mentzer, 2001). This is accomplished through a shared vision and coordination of activities between linked firms, as well as reduced cost due to the elimination of operational duplication and resource waste (Andraski, 1998; Stank, Keller, and

Daugherty, 2001). This requires engaging in SCM practices that are both internal to the organization (*intra-organizational*) and external (*inter-organizational*) (Stank, Keller, and Daugherty, 2001).

Intra-organizational practices require cross-functional collaboration, coordination, and flexibility in the strategic planning process. Inter-organizational practices require sharing of information across the full range of supply chain participants, as well as sharing of internal cross-functional processes (Schrage, 1990). Our research focuses on both inter-organizational and intra-organizational SCM practices addressing these key dimensions in relation to the level of IT usage. Higher levels of both intra and inter-organizational SCM practices are expected to increase coordination of operations and logistics processes between organizations. Further, higher levels of coordination are expected to contribute to improved performance (Bowersox and Daugherty, 1995; Sheombar, 1992). Consequently our research extends the comparison to include organizational performance measures.

Our paper begins with a discussion of the conceptual model and research hypotheses. We then provide details of the survey methodology used and the statistical procedures used to categorize respondents based on level of IT usage (t-tests differentiating usage of specific applications and ANOVA). This is followed by a presentation of results of differences in intra and inter-organizational SCM practices based on IT usage, as well as organizational performance measures. Also provided are additional findings that help profile firms with advanced IT capability. We conclude with a discussion of our findings and implications.

2. Conceptual Model and Research Hypotheses

2.1 Conceptual model

Figure 1 shows the conceptual model used in this study. Information technology is shown as a factor influencing specific SCM practices (Raghunathan, 1999). Intra and inter-organizational SCM practices, in turn, are factors affecting organizational performance. This conceptual model

is derived from the literature. The purpose of our study is not to validate the model, but to use it as a framework for evaluating how levels of IT usage influence the other factors in the model. Specific variables that constitute this framework are shown in Table 1. These are discussed below.

(Figure 1 here)

(Table 1 here)

2.2 Intra-organizational variables

Three intra-organizational SCM practices are evaluated: *role of SCM in strategic planning*, *degree of cross-functional collaboration in strategic planning*, and *locus of control in strategic planning*. These intra-organizational dimensions evaluate the level of influence SCM has on the firm's strategic direction, as well as the existence of collaboration and power sharing necessary for SCM implementation. The first dimension directly addresses the role SCM plays in the strategic planning process of the firm, a necessary component of meaningful SCM implementation. The importance of aligning functional strategies with those of the firm and making them part of the overall strategy has been well documented in the literature (Skinner, 1969; Hayes and Wheelwright, 1984; Hill, 2000). Strategy formulation requires active participation of the functional strategies for successful alignment of individual strategies with the business strategy (Hill, 2000). This holds true for supply chain strategy as well.

The second two dimensions address issues that can be viewed as fundamental prerequisites to the incorporation of SCM within the organization. SCM relies on the close integration of internal functions within the firm, such as procurement, logistics/distribution, product design/development, manufacturing, and marketing. Cross-functional collaboration within the firm is necessary before this practice can be extended across the supply chain (Vickery, Calatnone, and Droge, 1999).

Cross-functional collaboration, in turn, requires a more flexible rather than rigid strategic planning process (Bates, Amundson, Schroeder, and Morris, 1995; Maloni and Benton, 2000). Centralization versus decentralization refers to the vertical locus of decision-making authority in the firm. The more decentralized the decision-making the lower the locus (Vickery, Droge, and Germain, 1999). A highly centralized strategic planning process typically does not give sufficient power to individual groups or functions. With the emphasis on employee empowerment and autonomy, decentralization has been given greater emphasis in the literature (MacDuffie, 1995; Spreitzer, 1995). On the other hand, a highly decentralized strategic planning process can create fragmentation and lose constancy of vision. A preferred way is a flexible system that mixes some elements of both decentralization and centralization (Chen, Federgruen, and Zheng, 2001). While cross-functional collaboration and flexibility in strategic planning process are necessary for greater strategic involvement of SCM, though they do not guarantee it.

2.3 Inter-organizational variables

Although there are numerous elements that define inter-organizational SCM, we focus on types of collaborations with suppliers (Choi and Hartley, 1996; Lambert, Emmelhainz and Gardner, 1999; Monczka, Callahan, and Nichols, 1995; Tan, Kannan, and Handfield, 1998; Zaheer, McEvily and Perrone, 1998). SCM enhances competitive performance through internal cross-functional collaboration that is linked with the functions of suppliers and channel members (Monczka, Petersen, Handfield, and Ragatz, 1998; Vickery, Calantone, and Droge, 1999). Different gradations of collaboration exist depending on the type of information being shared and the nature of the collaboration process. Our study looks at four levels of collaboration: *sharing of operations and planning information; sharing of cross-functional processes; participation in collaborative networks with multiple suppliers; and sharing of financial information.*

Sharing of operations and planning information is the most fundamental level of information sharing that allows for synchronous execution and decision making. This includes

information on production and delivery schedules, production plans, and new product development. IT capabilities such as the Internet, extranets, and ERP software have made this type of information sharing feasible for many firms. However, the use of this technology does not ensure the practice of SCM which goes beyond simple information sharing.

As companies move along the continuum of SCM practices they evolve from mere information sharing with partners to synchronous execution of policies. The goal is to eventually move to a common vision and shared resources (Kahn and Mentzer, 1996; Stank, Keller, and Daugherty, 2001). Sharing of cross-functional processes with suppliers elevates the relationship by putting in place the inter-organizational infrastructure necessary for collective decision making. This infrastructure enables supply chains to be complete entities capable of competing against each other (Fine, 1998). As companies develop their supply chain capability they increase their participation in collaborative networks that include multiple suppliers. Sharing of financial information, including financial burdens and benefits, elevates the supply chain relationship even further. This is the highest level of sharing that requires commitment and trust among supply chain partners, and allows partners to jointly reap the benefits of their coordination.

2.4 Organizational performance measures

Numerous measures have been suggested in the literature for evaluating organizational and supply chain performance (Krajewski and Ritzman, 1998; Handfield and Nichols, 1999). Our study focuses on four performance measures commonly seen in the literature: cost reduction, cycle time reduction, quality improvement, and market share growth (Vickery, Calantone, and Droge, 1999; Ward and Duray, 2000). The first three measures evaluate organizational success relative to specific operational performance. The last measure, market share growth, looks at overall organizational performance over the last three years.

2.5 Research hypotheses

SCM is built on a foundation of functional integration, both within the firm and between firms. Also, SCM involves a strategic vision and flexibility in strategic decision making. Given that these activities are supported through a strong IT capability we expect firms with high IT usage to have significantly greater participation in both the intra and inter-organizational SCM activities (Larson, 1994; Lewis and Talalayevsky, 1997). This leads to our first two hypotheses:

- H1:** Advanced IT capability is associated with significantly greater involvement of *intra-organizational* SCM activities.
- H2:** Advanced IT capability is associated with significantly higher levels of *inter-organizational* SCM activities.

Studies have shown that information brings great value to supply chains and has been shown to result in significant organizational improvements, including cost savings (Gavirneni, Kapuscinski, and Tayur, 1999). High technological capability has also been shown to provide a clear competitive advantage and can be a differentiating factor in terms of company performance (Kathuria, Anandarajan, and Igbaria, 1999). This leads to the formulation of our third hypothesis:

- H3:** Advanced IT capability is associated with significantly higher organizational performance measures.

3. Method

3.1 The sampling procedure

A survey methodology was used to collect data for this research. The type of information needed is strategic in nature. Consequently the survey instrument was sent to the highest ranking officer of primarily large manufacturing companies with annual sales in excess of \$4.5 billion. Our study focused on large firms typically seen as leaders in SCM. The instrument was initially field tested by members of APICS, the Council of Logistics Management (CLM), and the

National Organization of Purchasing Management (NAPM). Following modification, the instrument was mailed to 2,000 U.S. industrial companies.

Approximately one-third of the responses were returned unanswered due to corporate policy prohibiting participation in studies of this nature. From the remaining 1,340 potential company participants, 116 useable questionnaires were returned. Although the response rate was only 8.7 percent, considering the organizational level at which the survey was completed, the total response rate of 116 is quite large. The typical respondent to the survey held the title of President, CEO, Vice President, or Director of procurement and purchasing. The majority of the companies responding to the survey were manufacturing firms (84.7 percent). The remaining firms were classified as department stores/mass retailers (4.5 percent), warehouse and distribution firms (7.2 percent), and transportation firms (3.6 percent).

3.2 Test for non-response bias

A concern with any survey methodology is the adequacy of the response sample. Therefore, it is important to conduct a test for non-response bias. To ensure adequacy of our data we compared the demographics of the first and second wave of respondents, each wave constituting a quartile of the data (Armstrong and Overton, 1977). Dimensions tested included average sales, market share growth, and industry mix. No significant differences were found between the two samples.

3.3 Measurement for level of IT usage

Stratification of the data based on level of IT usage was initially made using a self-reported rather than objective measure. Setting an arbitrary norm was not appropriate as standards of technology greatly vary between industry segments and would only confound errors. In addition, using a subjective or perceptual measure was considered important as studies have shown these perceptions to influence decision making behavior of individuals in the

organizational environment (Weick, 1995; Argyris and Schon, 1996). The initial self-reported stratification was then validated through the use of objective measures and statistical analysis. This is described below.

In order to stratify the survey data based on IT usage respondents were asked to rate the IT usage of their respective companies relative to the norm for their industry. The question was based on a five-point Likert type scale, with *one* indicating least usage, *three* average usage, and *five* highest usage. Respondents were instructed that companies with low or high ratings would be considered below or above their industry norm, with a medium rating reflecting the industry standard. Responses were then aggregated into three broad categories: low, medium, and high. The low IT category was formed from ratings of either *one* or *two*. A rating of *three* (the median) formed the medium IT category. Finally, the high IT category was formed from ratings of *four* and *five*.

Figure 2 shows the division of survey respondents based on level of IT usage. Survey respondents are roughly evenly divided between categories. Approximately twenty-six percent are found to be above industry standard and form the high IT category. Of the remainder, thirty-six percent are equal to their industry standard, and thirty-eight percent are below.

(Figure 2 here)

To document the validity of the self-reported measure, respondents were asked to indicate their company's degree of usage of specific IT applications. We tested degree of usage of six IT applications, selected on the basis of their prominence in academic and practitioner publications: 1) enterprise resource planning (ERP); 2) real time access to point of sale (POS) data; 3) real time access to inventory replenishment; 4) electronic bulletin boards for suppliers; 5) supplier management IT applications (includes *extended* ERP, Internet, extranets); 6) collaborative planning for replenishment programs (CPFR). A five point Likert-type scale was used to ascertain degree of usage, with responses ranging from *no usage* (response of *one*) to

complete usage (response of *five*). A t-test was used to determine significant differences in application usage between IT levels of survey respondents.

Significant differences, at the 0.05 percent level, were found for all IT applications tested. High IT firms were found to have significantly greater usage of each IT application tested compared to low and medium IT firms in the sample. This finding is further supported by the results of a one-way ANOVA model which finds significant differences between high IT and medium and low IT firms in the sample ($F = 14.56, p > 0.10$). These statistical tests document the validity of our self-reported measure and the usefulness of our sample.

4. Results

4.1 Findings on intra-organizational variables

Findings relative to the first hypothesis, H1, are shown in Table 2. The table shows the three intra-organizational variables with the associated five-point scale. Significant differences at the 0.05 percent level are shown between both high and low IT firms, as well as high and medium IT firms.

(Table 2 here)

Our findings reveal significant differences relative to all three intra-organizational variables. First, the number of high IT firms that identified the role of SCM in strategic planning as highly significant is more than double that of other firms. Similarly, a significantly smaller number of high IT firms identified the strategic role of SCM as somewhat insignificant. Based on this finding our study suggests that the role of SCM in strategic planning of high IT firms is indeed significantly greater than that of firms with lower IT capability.

Even more definitive are the findings relative to the degree of cross-functional collaboration in strategic planning. Significant differences between high IT and other firms exist for almost all comparisons. Well over fifty percent of high IT firms identified cross-functional

collaboration as either somewhat high or very high. In addition, there are no high IT respondents that identified cross-functional collaboration as either very low or somewhat low.

Findings relative to locus of control in strategic planning also support the hypothesis that high IT firms have greater involvement in intra-organizational SCM practices. However, our findings appear to largely identify traits of low IT firms. We note that relative to this variable a mixed locus of control is preferred. Our findings show that the majority of medium and high IT firms use a mixed locus of control, significantly different from low IT firms. By contrast low IT firms tend to rely on a highly centralized locus of control. We recall that the literature associates centralization with less worker and functional autonomy (MacDuffie, 1995; Spreitzer, 1995), diametrically opposed to employee empowerment. While our study does not prove causation, we show the coexistence of a policy of high centralization with low IT usage.

These findings provide support for the first hypothesis, H1. In addition to the statistical results shown in Table 2, Pearson's correlation coefficients were computed for all pairings. Though not shown due to space consideration, the significance of the correlation coefficients confirms the initial statistical tests. Based on these findings we conclude that firms with high usage of IT engage in intra-organizational SCM practices to a significantly greater degree than firms with lower IT capability.

4.2 Findings on inter-organizational variables

Findings relative to inter-organizational variables, hypothesis H2, are shown in Table 3. We note that the five-point scale used, ranging from no sharing to complete sharing has been collapsed into three dimensions as very few responses were identified at the tails of the scale. Again, significant differences at the 0.05 level between high and low IT firms, as well as high and medium IT firms, are highlighted.

(Table 3 here)

Overall our findings support the hypothesis that high IT firms engage in inter-organizational SCM practices to a significantly greater degree than firms with lower IT capability. Some specific findings are of particular interest. First, the vast majority of high IT firms have either much or complete sharing of operational and planning information with their suppliers. This is significantly greater than found in the remaining data sample. Similarly, sharing of cross-functional processes and the participation in collaborative networks decisively show the greater extent of inter-organizational SCM practices of high IT firms.

However, our findings reveal that as the degree of sharing required by a particular SCM practice increases the number of respondents who participate in that practice drops. For example, the number of high IT firms that share operations and planning information is sixty percent, compared with fifty-two percent for sharing of cross functional processes and forty-five percent for participating in collaborative networks. This figure drops dramatically to a mere twenty-six percent for sharing of financial information.

Based on our findings high IT firms lead in sharing of financial information with a significantly higher number of respondents having some financial sharing in place. By contrast well over fifty percent of both low and medium IT firms expressed little or no financial sharing. However, we note a general and marked decrease in the sharing of this type of information between firms. Although the SCM literature stresses the importance of this type of sharing, our findings reveal a lag in this practice. Even high IT firms are found to engage in financial sharing only to a modest degree. Again, Pearson's correlation coefficients were computed for all pairings and provide additional statistical support for these findings.

4.3 Findings on organizational performance measures

Table 4 links IT usage with the organizational performance measures tested. Significant differences in findings between high IT and low/medium IT firms are indicated in boldface. A significantly larger percentage of high IT firms report having a major or significant benefit in

terms of all measures tested compared to the other firms in the sample. Relative to the operational measures tested, IT capability appears highly associated with benefits in cost reduction and cycle time reduction. Significant benefits also appear in terms of quality improvement, though to a lesser extent.

(Table 4 here)

Relative to overall company performance, measured by market share growth, we observe that a significantly greater number of high IT firms experienced a substantial increase in market share growth over the past three years compared to the other firms in our data. There are no high IT firms in our study that report a decrease in market share.

These findings, which are further confirmed through Pearson's correlation coefficients, provide support for our last hypothesis. We conclude that high IT capability is indeed associated with higher organizational performance.

4.4 Other findings

The purpose of our study was to profile companies with high IT capability, evaluating a number of organizational factors in conjunction with IT usage. In addition to the findings described thus far other findings help us develop a better understanding of firms with high IT capability. The level of IT usage was correlated with a number of additional organizational factors. A number of these, such as type of environmental uncertainty and length of product life cycle, did not reveal any significant differences. However, other findings are of interest.

We find degree of customization to be positively related to the level of information technology use. Forty-six percent of high IT firms identified themselves as offering primarily customized products. This compares with thirty and twenty-five percent for low and medium IT firms respectively. This is in line with our finding that high IT firms have greater organizational flexibility, a characteristic typical of a high customization environments (Hayes and Wheelwright, 1984).

Further, a significantly greater number of high IT firms (forty-one percent) report an increase in the mandate of supplier certification requirements over the past three years. This compares with a more modest twenty-six and thirty percent reported by low and medium IT firms respectively. This last finding is in line with the strong SCM direction of most IT firms found in our study.

5. Discussion and conclusion

This research documents the significant role of information technology as an enabler of both inter and intra organizational supply chain management practices. We also show the improvements in organizational performance measures associated with high IT capability. We summarize our findings with four key points:

- Firms with high IT usage are found to engage in both intra and inter-organizational SCM practices to a higher degree than less IT capable firms. These firms have a greater SCM involvement in organizational strategic planning and a higher degree of cross-functional collaboration at the strategic planning level. Both high and medium IT firms have a strategic planning process that is mixed centralized/decentralized in structure while low IT firms are found to have a more centralized strategic planning process.
- Firms with high IT usage are found to engage in all forms of information sharing to a significantly larger degree. However, the number of firms participating in a particular sharing practice drops as the degree of sharing required increases. For example, even high IT firms engage in sharing of financial information only to a modest degree.
- Firms with high IT usage significantly excel on performance measures tested, such as cost reduction, cycle time reduction, quality improvement, and market share growth.
- Customization is positively related with high IT usage, with almost half of all high IT firms identifying themselves as offering primarily customized products.

Our study documents the relationship between SCM practices of firms and the level of IT usage. Our research does not prove that higher IT usage directly promotes a greater SCM orientation or vice versa. However, our evidence shows that firms with greater use of information technology participate in SCM practices to a greater degree and achieve performance measures disproportionately higher than that of firms with lower use of IT. As information technology evolves more ongoing research is needed to help academics and practitioners keep abreast of these changes, capabilities, and key drivers of information technology use. Our research seeks to contribute to this knowledge by providing an understanding of firms that lead in their IT capability.

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Figure 1. Research framework Linking SCM Practices and IT Usage with Organizational Performance Measures

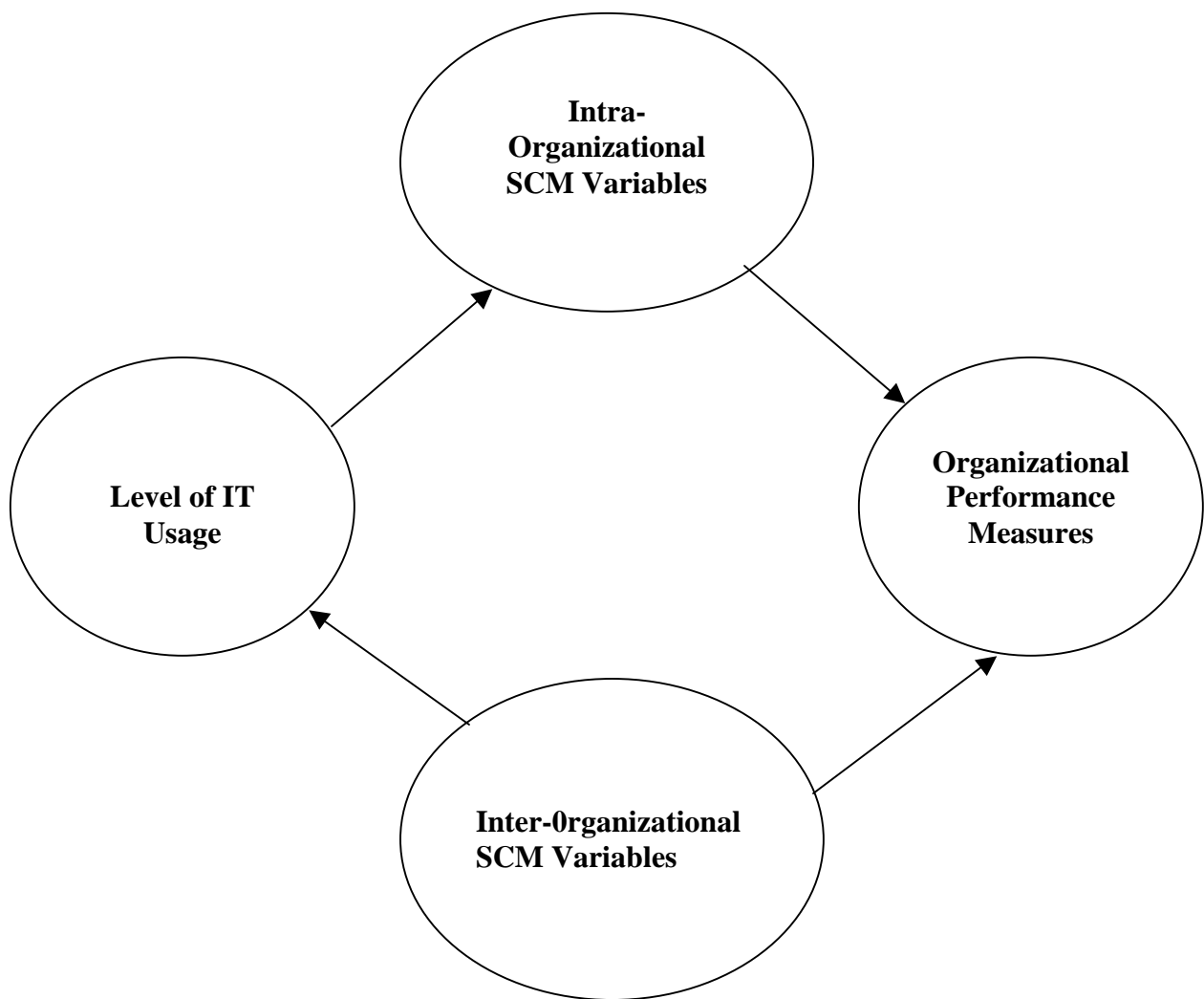


Table 1**Model variables**

Intra-organizational variables

X1: Role of SCM in strategic planning.

X2: Cross-functional collaboration in strategic planning.

X3: Locus of control in strategic planning.

Inter-organizational variables

Y1: Sharing operations and planning information with suppliers.

Y2: Sharing cross-functional processes with suppliers.

Y3: Engaging in collaborative networks with multiple suppliers.

Y4: Sharing financial information with suppliers.

Organizational performance measures

Z1: Cost reduction

Z2: Cycle time reduction

Z3: Quality improvement

Z4: Change in market share

Figure 2. IT usage level of survey respondents

| Levels of IT Usage | Response (%) |
|---------------------------|---------------------|
| Low Level | 37.8 |
| Medium Level | 36.0 |
| High Level | 26.1 |

Table 2
Intra-organizational variables differentiated by IT usage

| 1. Role of SCM in Strategic Planning | Highly Insignificant (%) | Somewhat Insignificant (%) | Moderate (%) | Somewhat Significant (%) | Highly Significant (%) |
|--|--------------------------|----------------------------|--------------|--------------------------|------------------------|
| Low IT | 3 | 34 | 34 | 19 | 12 |
| Medium IT | 0 | 26 | 43 | 20 | 10 |
| High IT | 0 | 14** | 37 | 22 | 27** |
| 2. Cross-functional Collaboration in Strategic Planning | Very Low (%) | Somewhat Low (%) | Moderate (%) | Somewhat High (%) | Very High (%) |
| Low | | 15 | 39 | 24 | 22 |
| Medium | | 5 | 28 | 44 | 23 |
| High | | 0 * | 11** | 56 * | 33 ** |
| 3. Locus of Control in Strategic Planning | Very Decentralized (%) | Somewhat Decentralized (%) | Mixed (%) | Somewhat Centralized (%) | Highly Centralized (%) |
| Low | 0 | 20 | 29 | 20 | 32 |
| Medium IT | 1 | 7 | 59 | 23 | 10 |
| High IT | 2 | 13 | 45 * | 33 | 7** |

* Significant differences between high and low IT firms at 0.05 level.

** Significant differences between both high and medium, *and* high and low IT firms at 0.05 level.

Table 3
Inter-organizational SCM practices differentiated by IT usage

| 1. Sharing Operations and Planning Information | Little or No Sharing (%) | Some Sharing (%) | Much or Complete Sharing (%) |
|---|--------------------------|------------------|------------------------------|
| Low | 28 | 35 | 37 |
| Medium | 21 | 36 | 43 |
| High | 18 | 22 | 60 ** |
| 2. Sharing Cross Functional Processes | | | |
| Low | 45 | 35 | 20 |
| Medium | 18 | 64 | 18 |
| High | 11 * | 37 | 52 ** |
| 3. Participation in Collaborative Networks | | | |
| Low IT | 39 | 50 | 11 |
| Medium IT | 34 | 51 | 15 |
| High IT | 11 | 44 | 45 ** |
| 4. Sharing Financial Information | | | |
| Low IT | 55 | 25 | 20 |
| Medium IT | 56 | 31 | 13 |
| High IT | 26 ** | 48 ** | 26 |

* Significant differences between high and low IT firms at 0.05 level.

** Significant differences between both high and medium, *and* high and low IT firms at 0.05 level.

Table 4
Organizational performance measures differentiated by IT Usage

| 1. Cost | No Benefit | Minor Benefit | Some Benefit | Significant Benefit | Major Benefit |
|------------------------|----------------------|-----------------|--------------|---------------------|----------------------|
| Low IT | 0 | 28 | 33 | 30 | 10 |
| Medium IT | 3 | 13 | 36 | 39 | 9 |
| High IT | 0 | 5 * | 31 | 42 | 22** |
| 2. Time | | | | | |
| Low IT | 15 | 23 | 35 | 27 | 0 |
| Medium IT | 8 | 21 | 36 | 31 | 5 |
| High IT | 0 * | 15 | 35 | 38 | 12 * |
| 3. Quality | | | | | |
| Low IT | 5 | 30 | 32 | 25 | 8 |
| Medium IT | 3 | 14 | 31 | 45 | 8 |
| High IT | 0 | 13 | 23 | 54 * | 10 |
| 4. Market Share | Substantial Decrease | Modest Decrease | No Change | Modest Increase | Substantial Increase |
| Low IT | 5 | 13 | 11 | 54 | 17 |
| Medium IT | 3 | 7 | 16 | 49 | 25 |
| High IT | 0 | 0 | 19 | 48 | 33** |

* Significant differences between high and low IT firms at 0.05 level.

** Significant differences between both high and medium, *and* high and low IT firms at 0.05 level.